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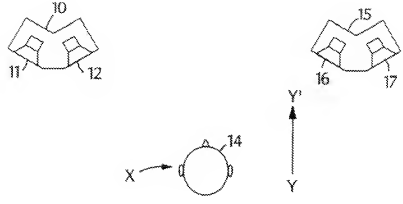

FIG. 1A

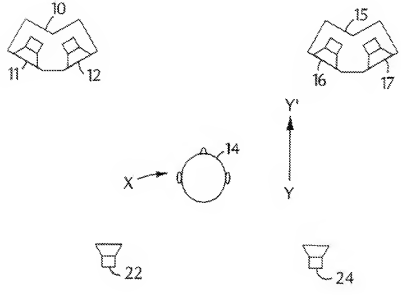

FIG. 1B

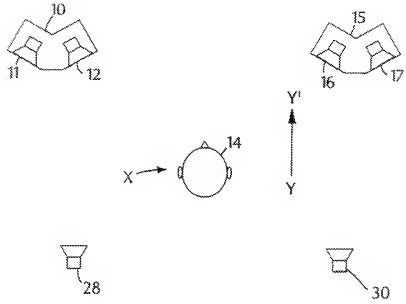

FIG. 1C

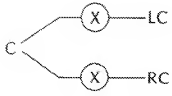

FIG. 2B

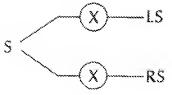

FIG. 2C

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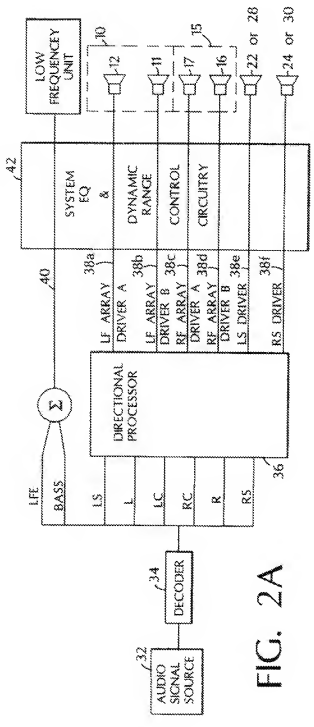
AUDIO SIGNAL SOURCE
32
DECODER
24
LFE
BASS
LS
L
LC
RC
R
RS
Σ
40
DIRECTIONAL PROCESSOR
36
38a LF ARRAY DRIVER A
38b LF ARRAY DRIVER B
38c RF ARRAY DRIVER A
38d RF ARRAY DRIVER B
38e LS DRIVER
38f RS DRIVER
42
SYSTEM EQ &
DYNAMIC RANGE
CONTROL
CIRCUITRY
LOW FREQUENCY UNIT
10
12
11
17
15
16
22 or 28
24 or 30

FIG. 2A

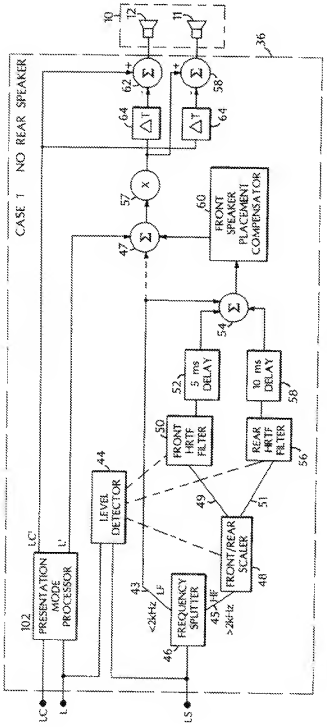
CASE 1 NO REAR SPEAKER
LC
L
LS
102
PRESENTATION MODE PROCESSOR
LC'
L'
LEVEL DETECTOR
44
FREQUENCY SPLITTER
46
<2kHz LF
>2kHz HF
43
45
FRONT/REAR SCALER
48
49
51
FRONT HRTF FILTER
50
REAR HRTF FILTER
56
5 ms DELAY
52
10 ms DELAY
58
54
47
57
FRONT SPEAKER PLACEMENT COMPENSATOR
60
62
64
10
12
11
36

FIG. 3A

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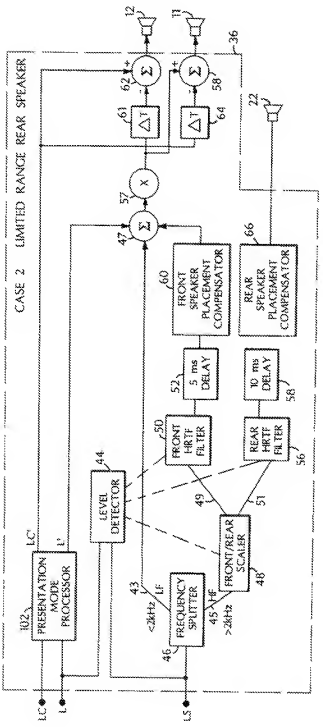
CASE 2 LIMITED RANGE REAR SPEAKER
102
PRESENTATION MODE PROCESSOR
LC'
L'
LC
L
LS
FREQUENCY SPLITTER
43
<2kHz
LF
45
>2kHz
HF
46
FRONT/REAR SCALER
48
49
51
LEVEL DETECTOR
44
FRONT HRTF FILTER
50
REAR HRTF FILTER
56
5 ms DELAY
52
10 ms DELAY
58
FRONT SPEAKER PLACEMENT COMPENSATOR
60
REAR SPEAKER PLACEMENT COMPENSATOR
66
57
47
61
62
64
58
36
12
13
22

FIG. 3B

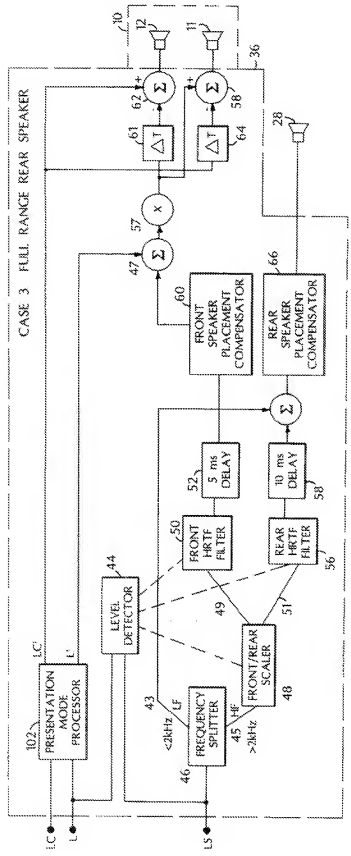
CASE 3 FULL RANGE REAR SPEAKER
LC
L
LS
102
PRESENTATION MODE PROCESSOR
LC'
L'
44
LEVEL DETECTOR
43
<2kHz LF
45 >2kHz HF
FREQUENCY SPLITTER
46
49
51
48
FRONT/REAR SCALER
50
FRONT HRTF FILTER
52
5 ms DELAY
56
REAR HRTF FILTER
58
10 ms DELAY
60
FRONT SPEAKER PLACEMENT COMPENSATOR
66
REAR SPEAKER PLACEMENT COMPENSATOR
47
57
61
ΔT
64
ΔT
62
58
10
12
11
36
28

FIG. 3C

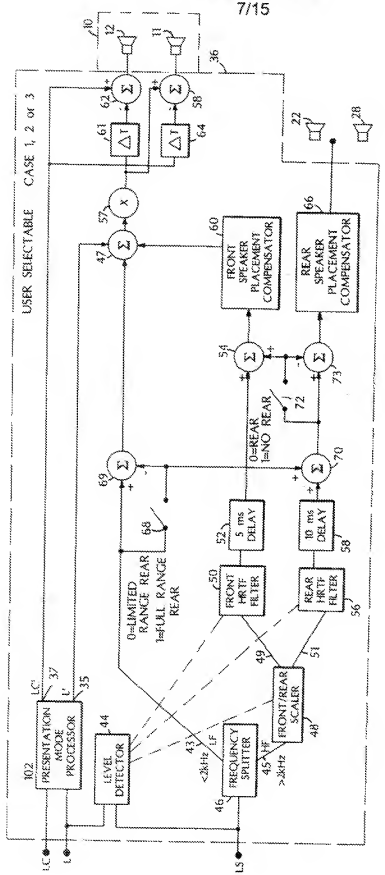
USER SELECTABLE CASE 1, 2 or 3
PRESENTATION MODE PROCESSOR
LEVEL DETECTOR
FREQUENCY SPLITTER
<2kHz LF
>2kHz HF
FRONT/REAR SCALER
FRONT HRTF FILTER
REAR HRTF FILTER
5 ms DELAY
10 ms DELAY
0=LIMITED RANGE REAR
1=FULL RANGE REAR
0=REAR
1=NO REAR
FRONT SPEAKER PLACEMENT COMPENSATOR
REAR SPEAKER PLACEMENT COMPENSATOR
LC
L
LS

FIG. 3D

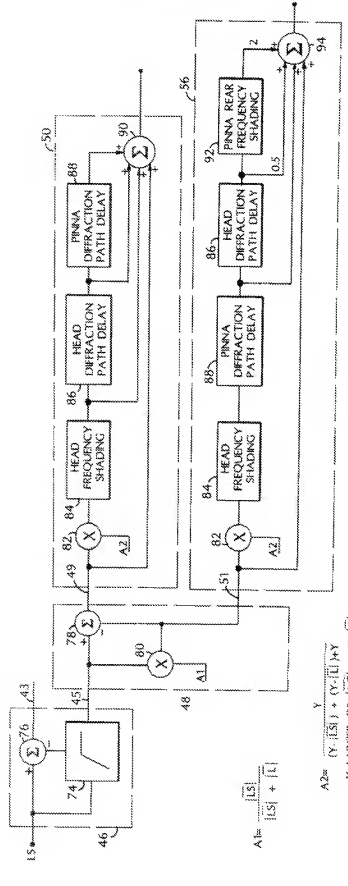
IS
46
74
76
43
45
48
78
80
A1
49
51
82
A2
84
HEAD FREQUENCY SHADING
86
HEAD DIFFRACTION PATH DELAY
88
PINNA DIFFRACTION PATH DELAY
90
50
56
92
PINNA REAR FREQUENCY SHADING
0.5
2
94
A1= |S| / (|S| + |L|)
A2= Y / (Y-|S|) + (Y-|L|) ,Y=Y
Y=LARGER OF |G| AND |L|

FIG. 4

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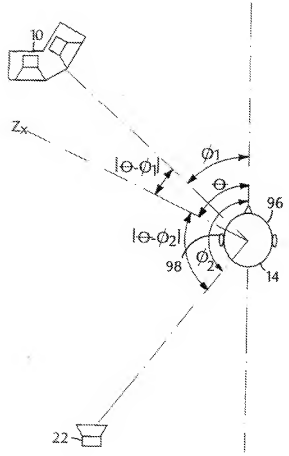

FIG. 5

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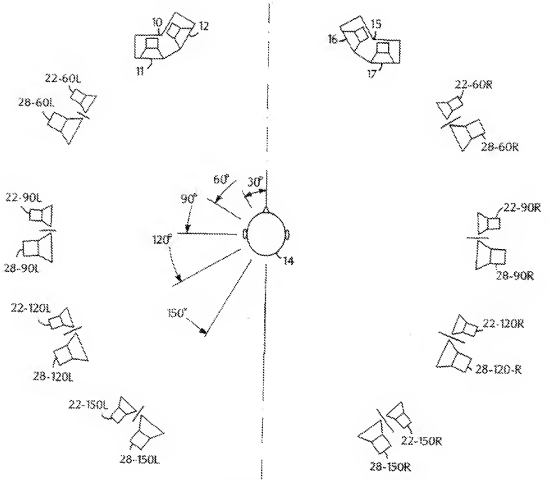
10
12
11
16
15
17
22-60L
28-60L
22-60R
28-60R
60°
30°
90°
120°
150°
14
22-90L
28-90L
22-90R
28-90R
22-120L
28-120L
22-120R
28-120-R
22-150L
28-150L
22-150R
28-150R

FIG. 6

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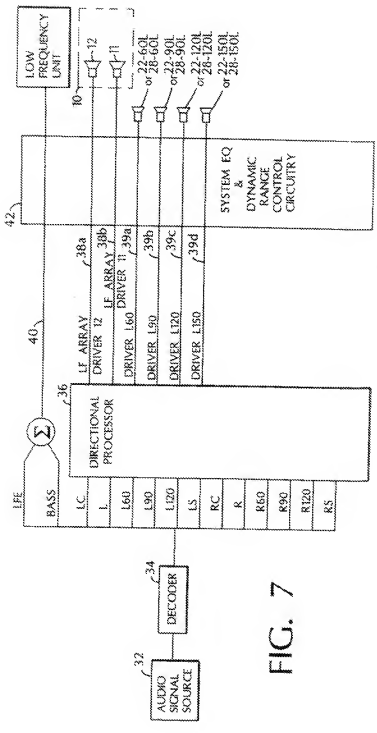
AUDIO SIGNAL SOURCE
32
DECODER
34
LFE
BASS
LC
L
L60
L90
L120
LS
RC
R
R60
R90
R120
RS
DIRECTIONAL PROCESSOR
36
Σ
40
LF ARRAY DRIVER 12
LF ARRAY DRIVER 11
DRIVER L60
DRIVER L90
DRIVER L120
DRIVER L150
38a
38b
39a
39b
39c
39d
42
SYSTEM EQ & DYNAMIC RANGE CONTROL CIRCUITRY
LOW FREQUENCY UNIT
10
12
11
or 22-60L 28-60L
or 22-90L 28-90L
or 22-120L 28-120L
or 22-150L 28-150L

FIG. 7

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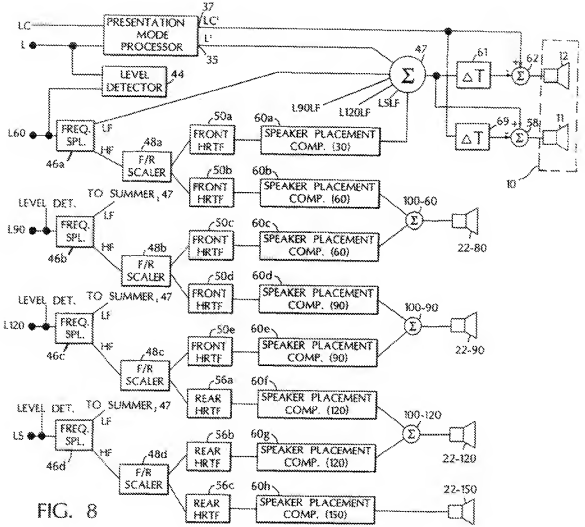
37
LC
L
PRESENTATION MODE PROCESSOR
LC'
L'
35
LEVEL DETECTOR
44
47
61
62
12
69
58
11
10
L90LF
L120LF
LSLF
L60
FREQ. SPL.
LF
HF
46a
48a
F/R SCALER
50a
FRONT HRTF
60a
SPEAKER PLACEMENT COMP. (30)
50b
FRONT HRTF
60b
SPEAKER PLACEMENT COMP. (60)
TO SUMMER, 47
LEVEL DET.
L90
46b
48b
50c
60c
SPEAKER PLACEMENT COMP. (60)
100-60
22-80
L120
46c
48c
50d
60d
SPEAKER PLACEMENT COMP. (90)
50e
60e
SPEAKER PLACEMENT COMP. (90)
100-90
22-90
LS
46d
48d
56a
REAR HRTF
60f
SPEAKER PLACEMENT COMP. (120)
56b
60g
SPEAKER PLACEMENT COMP. (120)
100-120
22-120
56c
60h
SPEAKER PLACEMENT COMP. (150)
22-150

FIG. 8

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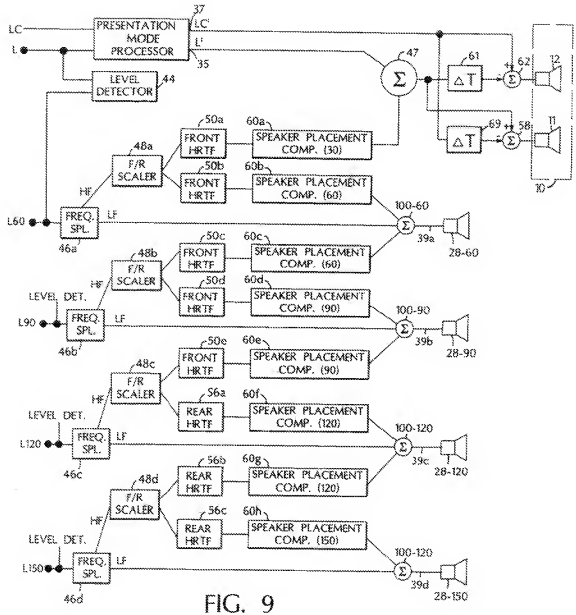
LC
L
PRESENTATION MODE PROCESSOR
37
LC'
L'
35
LEVEL DETECTOR
44
47
61
ΔT
62
12
69
ΔT
58
11
10
48a
F/R SCALER
50a
FRONT HRTF
60a
SPEAKER PLACEMENT COMP. (30)
50b
FRONT HRTF
60b
SPEAKER PLACEMENT COMP. (60)
HF
LF
L60
FREQ. SPL.
46a
100-60
39a
28-60
48b
F/R SCALER
50c
FRONT HRTF
60c
SPEAKER PLACEMENT COMP. (60)
50d
FRONT HRTF
60d
SPEAKER PLACEMENT COMP. (90)
LEVEL DET.
L90
FREQ. SPL.
46b
100-90
39b
28-90
48c
F/R SCALER
50e
FRONT HRTF
60e
SPEAKER PLACEMENT COMP. (90)
56a
REAR HRTF
60f
SPEAKER PLACEMENT COMP. (120)
LEVEL DET.
L120
FREQ. SPL.
46c
100-120
39c
28-120
48d
F/R SCALER
56b
REAR HRTF
60g
SPEAKER PLACEMENT COMP. (120)
56c
REAR HRTF
60h
SPEAKER PLACEMENT COMP. (150)
LEVEL DET.
L150
FREQ. SPL.
46d
100-120
39d
28-150

FIG. 9

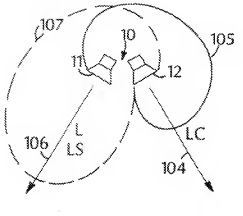

FIG. 10A

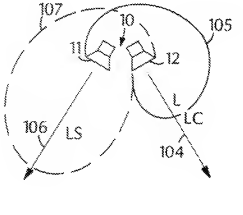

FIG. 10B

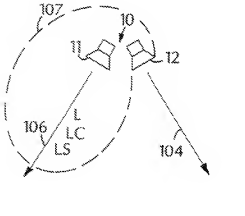

FIG. 10C

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FIG. 11

SWITCH 110 POSITION	SWITCH 118 POSITION	LC' CONTENT (TERM. 37)	L' CONTENT (TERM. 35)	PRIMARY 104 NULL 106	PRIMARY 106 NULL 104	REF. FIG.
OPEN	OPEN	LC	L	LC	L+LS(LF)	10a
CLOSED	OPEN	L+LC	———	L+LC	LS	10b
OPEN	CLOSED	———	L+LC	———	L+LC+LS(LF)	10c
CLOSED	CLOSED	———	L+LC	———	L+LC+LS(LF)	10d